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<p>Lidar observations of the winter middle atmospheric thermal tides at Table Mountain (34.4N) and comparison with HRDI and GSWM.</p> <p>Thierry Leblanc ¹((760) 249-1070; leblanc@tmf.jpl.nasa.gov) I. Stuart McDermid ((760) 249-4262; mcdermid@tmf.jpl.nasa.gov)</p> <p>¹Jet Propulsion Laboratory California Institute of Technology Table Mountain Facility P.O. Box 367, WRIGHTWOOD, CA 92397, United States</p> <p>The tidal signature in the middle atmospheric thermal structure is investigated using more than 140 hours of nighttime lidar measurements at Table Mountain (34.4°N) during January 1997 and February 1998. The lidar profiles (30-85 km) reveal the presence of persistent mesospheric temperature inversions around 65-70 km altitude with a clear Local-Solar-Time (LST) dependence. Daytime temperature profiles (65-105 km) obtained by the High Resolution Doppler Imager (HRDI) onboard the Upper Atmosphere Research Satellite (UARS) in January and February from 1994 to 1997 and zonally averaged at the latitude of TMF are considered together with the lidar results. The daytime HRDI and nighttime lidar temperature differences from their respective daytime and nighttime averages are compared to the equivalent differences predicted by the Global Scale Wave Model (GSWM). A remarkable consistency is observed between the lidar and the HRDI upper mesospheric thermal structure, with a continuous downward propagation of warm temperatures from 100 km at 10:00 LST to 75 km at 20:00 LST and 65-70 km at 3:00-5:00 LST surrounded above and below by colder temperatures. This structure is predicted by GSWM but with a 2-4 hour delay and a weaker amplitude. On the lower side of this structure (i.e. 65-70 km) a thin layer, characterized by early night cold temperatures and late night warm temperatures, is identified as the result of the downward propagation of the temperature inversions. Using simulated data and a "first-guess" method, and assuming that the observed temperature variability was entirely driven by tides, some estimations of the diurnal and semidiurnal phases and amplitudes have been made from the lidar measurements between 40 and 85 km altitude. The estimated diurnal amplitude exhibits a minimum at 63 km with a fast phase transition characteristic of the transition between the upper stratospheric trapped modes (phase at 18:00 LST) and the upward propagating modes. This transition layer is predicted by GSWM to be at 5 km lower altitude, altitude shift present throughout the middle mesosphere. Immediately above the transition layer the very fast growing diurnal amplitude between 65 and 72 km is followed by a substantial decrease and by the emergence of the semidiurnal component resulting in the formation of the mesospheric temperature inversion layers.</p>	<p>Meeting: 1998 Fall Meeting</p> <p>Membership Number: Thierry Leblanc AGU - 30045123</p> <p>Contact Information:</p> <p>Student rate: Not Applicable</p> <p>Willing to chair a session:</p> <p>Meeting Section: SA - SPA-Aeronomy</p> <p>Special Session: SA02 - Mesosphere Inversion Layer Structure: New Results and New Theories</p> <p>Index Terms: 3332,3384,3334,0350</p> <p>Theme: *Climate and Global Change</p> <p>Material presented: 100% JGR Atmospheres</p> <p>Contributed</p> <p>Poster presentation requested:</p> <p>Scheduling request:</p> <p>Credit card: VISA:xxxx xxxx xxxx 7489 exp. [date not shown for security] cardholder: Thierry Leblanc billing zip: 92397 ph: (760) 249-1070 e-mail: leblanc@tmf.jpl.nasa.gov</p>
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